

## THE CHANGING STATUS OF MARINE BIRDS BREEDING AT SAN BENEDICTO ISLAND, MEXICO

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**ABSTRACT.**—We reviewed the status of the breeding marine birds on San Benedicto Island, Mexico, based on >100 years of published observations and seven of our own surveys conducted between 1978 and 2000. We found that there have been marked changes in the island avifauna with two main trends evident. First, a volcanic eruption destroyed much of the island in 1952. The Wedge-tailed Shearwater (*Puffinus pacificus*; estimated breeding population 1,000 pairs), Townsend's Shearwater (*Puffinus auricularis*; probable breeder, small numbers), and Red-footed Booby (*Sula sula*; 60 pairs) historically had much larger populations, but they apparently never fully recovered from the eruption. The Masked Booby (*Sula dactylatra*; 2,185 pairs), however, has become much more abundant perhaps due to changes in the vegetation. The second trend is that within the last three decades at least two, and possibly four, species from the central Pacific have colonized the island. The Laysan Albatross (*Phoebastria immutabilis*; 12 pairs) started breeding in the late 1980s; Black-footed Albatross (*Phoebastria nigripes*; 1 pair) in 2000. Red-tailed Tropicbirds (*Phaethon rubricauda*; probable breeder, 10 pairs) may have started breeding in the 1980s, and at least some of the breeding Brown Boobies (*Sula leucogaster*; 300 pairs) are from central Pacific populations. The reason(s) for this influx of central Pacific species is unknown, but likely involves changes in the marine environment. Other breeding species include the Red-billed Tropicbird (*Phaethon aethereus*; 200 pairs), Nazca Booby (*Sula grantii*; 50 pairs), Great Frigatebird (*Fregata minor*; 165 pairs), and Magnificent Frigatebird (*Fregata magnificens*; 5 pairs). Received 21 June 2001, accepted 16 April 2002.

The Revillagigedo Islands are comprised of four scattered volcanic islands off the Pacific coast of Mexico: Socorro, San Benedicto, Clarión, and Roca Partida. San Benedicto Island (19° 18' N, 110° 49' W) is located 370 km south of the tip of Baja California. It is a small (6.4 km × 3.2 km), uninhabited, oceanic island. In August 1952, it erupted and formed a new volcanic crater (Bárcena) next to the old one (Herrera; Fig. 1). The eruption eliminated all of the terrestrial plant life, destroyed most of the nesting seabirds, and drove to extinction the only resident landbirds: Common Raven (*Corvus corax*) and an endemic subspecies of Rock Wren (*Salpinctes obsoletus exsul*; Townsend 1890, Brattstrom 1963). By November 1953 the biological recovery of the island was underway; vegetation was sprouting and seabirds were roosting and starting to nest again.

Ornithological investigations of the island occurred during three distinct periods (Table 1). Early expeditions established a bird list for the island but provided only qualitative assessments of the number of birds present

(Townsend 1890; Anthony 1898, 1900; Kaeding 1905; Hanna 1926; McLellan 1926). Interest in documenting the fate of the island biota in the aftermath of the eruption stimulated a second period of investigation (Brattstrom and Howell 1956, Brattstrom 1963). After another hiatus of about 25 years, the recent era of renewed interest began (Jehl and Parkes 1982, Brattstrom 1990, Howell and Webb 1990, Howell and Webb 1992a, this study).

In this paper we review the history and update the current status of marine birds breeding at San Benedicto Island, and discuss the major changes that have occurred there over time. An appendix lists landbird vagrants we recorded on the island.

### STUDY AREA AND METHODS

The southern half of San Benedicto formed when Bárcena volcano erupted in 1952; it is still covered with thick ash and supports almost no vegetation and few nesting birds. Our surveys on land were limited almost entirely to the northern half of the island which is vegetated mainly with dense patches of bunch grass (*Eragrostis diversiflora*). Richards and Brattstrom (1959) presented a physical description of the island, and Levin and Moran (1989) described the flora.

We visited the island seven times between 1978 and 2000, conducting surveys that typically lasted several hours on a single day (Table 1). In order to census the Masked Booby (*Sula dactylatra*) population, on four of our visits we photographed the entire island with a

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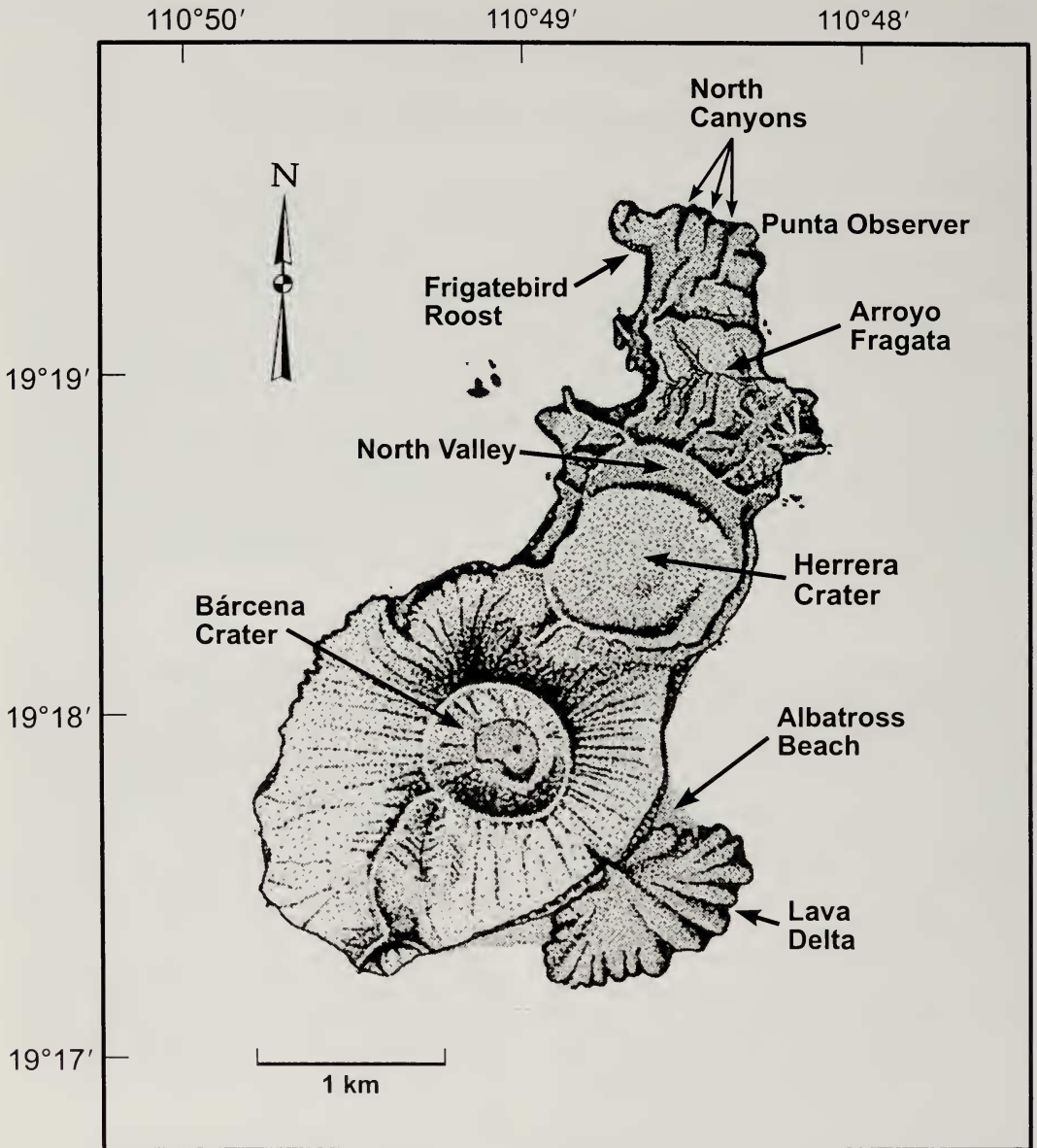


FIG. 1. San Benedicto Island, Mexico (after Richards and Brattstrom 1959).

series of overlapping images taken from a helicopter equipped with a large format (126 mm), belly-mounted camera. All aerial photographs will be permanently archived with the Map and Imagery Laboratory at the Univ. of California at Santa Barbara. For our historical review, in addition to published accounts, we also reviewed the field notes of E. Harrison (on file at Western Foundation of Vertebrate Zoology), who visited the island on 16 March 1938 and 20 April 1940, and S. N. G. Howell (unpubl. data), who visited the island on 25 April 1992.

## RESULTS AND DISCUSSION

We observed a total of 13 species of marine birds at San Benedicto Island; nine are confirmed breeders, three are probable breeders, and one a possible breeder.

*Species accounts.*—Laysan Albatross (*Phoebastria immutabilis*). We first observed this winter breeder roosting on the island in May 1987. Although we first found it breed-

ing in November 1990, it could have bred during any of the three previous seasons. Nearly all of the nesting occurs on the upper part of the island, along the north and west rim of Herrera Crater, and along the ridge running east-west just north of the crater. In 2000, one pair nested on Albatross Beach for the first time (Fig. 1). Although the population at San Benedicto is still small, it appears to be increasing steadily (Table 1).

Black-footed Albatross (*P. nigripes*). Jehl and Parkes (1982) referred to a specimen collected "at sea 24 km N of San Benedicto on 3 June 1897." This species was not recorded again within the archipelago until we observed a single individual standing among the Laysan Albatrosses on Albatross Beach in December 1999. In December 2000, we found a bird on an egg on the rim of Herrera Crater. Four days later, we stopped at Guadalupe Island (29° 00' N, 118° 20' W), Mexico, where military personnel showed us a "black albatross" nesting area, separate from the Laysan colony. Although no albatrosses were present at that time, we were told that there was a fully-feathered chick at that site in 1998, no nesting in 1999, and, at the time of our visit in 2000, a pair had been visiting the site every afternoon. From this we infer that this species also breeds on Guadalupe. These are the first reported breeding records for this species east of the Hawaiian Islands.

Wedge-tailed Shearwater (*Puffinus pacificus*). This species has declined considerably over time (Table 1). Anthony (1900) reported "thousands upon thousands" circling above the island at dusk in May 1897, and the south end of the island riddled with their burrows. It is clear that the decline and failure to recover of this species is directly related to the eruption; the "ash heap," where most of the nesting was concentrated before the eruption, was buried by Bárcena Crater. Since the eruption, although there has never been a systematic survey, much smaller numbers have been reported staging around the island in the evening. Brattstrom and Howell (1956) reported about 600 individuals in March 1953. Other, more recent estimates have been similar: 363 in April 1981 (Jehl and Parkes 1982) and "several hundred" in April 1990 (Santaella and Sada 1991). Based on the number of nesting burrows we found concentrated around the

rim of Herrera Crater, and scattered along the ridges of the northern canyons, we provisionally estimate the breeding population to be about 1,000 pairs.

Townsend's Shearwater (*P. auricularis*). Anthony (1898, 1900) found small colonies, each consisting of "not over a dozen" burrows in May 1897. Kaeding (1905) was at San Benedicto on the same expedition but reported a "large colony." None has been found breeding on the island since the 1952 eruption, and Jehl (1982) suggested that this species may have been extirpated. However, Santaella and Sada (1991) saw 20 individuals that seemed to be heading toward the top of the island at dusk in April 1990, and we saw a pair that appeared to be departing the island at dawn in December 1998. A small population may still breed on the island.

Red-billed Tropicbird (*Phaethon aethereus*). In December 2000, this species was noticeably more abundant than on any of our previous visits and we estimated a breeding population of 200 pairs. At that time birds seemed to be occupying every potential nest site on the island including those being investigated by *P. rubricauda* (see below). It apparently is a winter breeder; birds have been recorded on eggs in November (1953, 1990) and December (1999, 2000), with half grown chicks in March (1988), and a nearly fledged chick in April (1978); the exception was a large downy chick in December 1999.

Red-tailed Tropicbird (*P. rubricauda*). This species probably is a recent colonizer. It was first recorded in February 1988 when Howell and Webb (1990) observed birds courting and apparently scouting nest sites. One month later, we saw birds displaying, including one that occupied a potential nest cavity <2 m from a nesting Red-billed Tropicbird. *P. aethereus* currently outnumbers *P. rubricauda* at least by a factor of ten and the two species may compete for nest sites. Although it probably does breed at San Benedicto, until a bird is found with a chick or egg, Red-tailed Tropicbird must be considered a hypothetical breeder in the eastern Pacific. We estimate the total population at San Benedicto to be about 10 pairs.

Masked Booby (*Sula dactylatra*). Currently this is the most abundant nesting species, although prior to the eruption it was vastly out-



TABLE 1. Historical and present status of breeding seabirds at San Benedicto Island, Mexico. Values are total number of individuals present (number of nesting pairs estimated). P = present, "—" = not present (or not mentioned). Maximum counts are indicated in bold.

Survey date	Laysan Albatross	Black-footed Albatross	Wedge-tailed Shearwater	Townsend's Shearwater	Red-billed Tropicbird
March 1889 <sup>a</sup>	—	—	—	—	—
May 1897 <sup>b</sup>	—	—	<b>thousands</b>	<b>large colony</b>	common
May 1925 <sup>c</sup>	—	—	<b>thousands</b>	—	P
March 1953 <sup>d</sup>	—	—	hundreds	—	≥39
November 1953 <sup>d</sup>	—	—	—	—	P
April 1955 <sup>d</sup>	—	—	—	—	39
April 1978 <sup>e</sup>	—	—	<b>(1000)</b>	—	13
April 1981 <sup>f</sup>	—	—	P	—	—
May 1987 <sup>g</sup>	3	—	P	—	P
February 1988 <sup>h</sup>	11–14	—	—	—	(50–70)
March 1988 <sup>i</sup>	≥12	—	hundreds	—	<b>300</b> (150)
April 1990 <sup>j</sup>	—	—	P	—	50
November 1990 <sup>k</sup>	≥4 (1)	—	—	—	(75)
April 1992 <sup>l</sup>	9–12 (2–5)	—	(50–100)	—	(≥40–60)
December 1998 <sup>m</sup>	≥5	—	—	—	—
December 1999 <sup>n</sup>	≥18 (8)	<b>1</b>	—	—	(≥15)
December 2000 <sup>o</sup>	<b>21–25 (12)</b>	<b>2 (1)</b>	—	—	100–200 ( <b>200</b> )

<sup>a</sup> Townsend 1890.

<sup>b</sup> Anthony 1898, 1900; Kaeding 1905.

<sup>c</sup> Hanna 1926, McLellan 1926.

<sup>d</sup> Brattstrom and Howell 1956, Brattstrom 1963.

<sup>e</sup> RLP unpublished data, Jehl and Parkes 1982, RLP spent 10 h on island.

<sup>f</sup> Jehl and Parkes 1982.

<sup>g</sup> RLP unpublished data; spent 1 h on island.

<sup>h</sup> Howell and Webb 1990.

<sup>i</sup> RLP unpublished data; spent 6 h on island.

<sup>j</sup> Santaella and Sada 1991.

<sup>k</sup> RLP unpublished data; photographed island from air, spent 4 h on island.

<sup>l</sup> S. Howell unpublished data; spent 24 h on the island.

<sup>m</sup> RLP unpublished data; photographed island from air, no time on island.

<sup>n</sup> RLP unpublished data; photographed island from air, spent 4 h on island.

<sup>o</sup> RLP unpublished data; photographed island from air, spent 5 h on island.

<sup>p</sup> Breeding unconfirmed.

numbered by the Red-footed Booby (see General Discussion). From aerial photos we counted 2,185 pairs in 1998, 1,887 pairs in 1999, and 1,988 pairs in 2000. Approximately 75% occupied the floor of Herrera Crater; another 15% were in North Valley (Fig. 1). We have not included in Table 1 Brattstrom's (1963) estimate of 8,100 in August 1961 because it was made from the air and included 7,000 from the lava delta, an area where this species does not breed and rarely roosts. Masked Boobies have a variable breeding schedule on San Benedicto; eggs have been found every month that the island has been visited (February through May, November, and December). During some visits, all stages of nesting were recorded (March 1988, December 1999 and 2000); at other times, breeding appeared to be fairly synchronous (e.g.,

April 1978, when most nests had downy chicks).

Nazca Booby (*S. granti*). Although this species only recently has been recognized as distinct from the Masked Booby (Pitman and Jehl 1998), we first recorded an "orange-billed" Masked Booby (i.e., *S. granti*) at a nest in 1978. Our high count was in December 2000 when 30 nests at the Punta Observer colony (Fig. 1) contained eggs, chicks, or recently fledged young; two other birds were on nests in the northwest corner of the island, and another individual was on a nest among Masked Boobies near Herrera Crater. We estimate a breeding population of about 50 pairs. Hybridization between *S. granti* and *S. dactylatra* appears to occur to a limited extent on the island. Howell and Webb (1990) reported a mixed pair; during our surveys we

TABLE 1. Extended

Red-tailed Tropicbird	Masked Booby	Nazea Booby	Brown Booby	Red-footed Booby	Great Frigatebird	Magnificent Frigatebird
—	P	—	P	P	numerous	—
—	common	—	common	<b>abundant</b>	<b>thousands</b>	—
—	P	—	P	numerous	large numbers	—
—	30	—	2	—	10	—
—	535	—	6	2	150–200 (58–116)	—
—	1067	—	11	—	398	—
—	(1500–2000)	P	23 (4)	877 ( <b>100</b> )	100 (25)	P
—	2000 (1000)	—	20	400	100 (50)	several
—	P	—	P	P	—	≥1
2–5	(585–600)	4	(75–100)	(54)	(100)	12–14 (2)
≥6	<b>2500</b> (1017)	P	300 (62)	200	350 (150)	≥5
P	P	—	P	P	≥100	6
4	P	≥ <b>32</b> ( <b>50</b> )	(≥50)	(≥50)	≥200 (≥30)	≥6
(1–2)	(600–800)	2	(50–100)	<b>(50–100)</b>	<b>(150–200)</b>	<b>(5–10)</b>
—	<b>(2185)</b>	—	P	P	P	P
2	(1887)	≥3 (≥2)	P	(50)	P	—
<b>7–9</b> ( <b>10</b> ) <sup>a</sup>	(1988)	<b>(50)</b>	<b>300–400</b> ( <b>300</b> )	200–300	600 ( <b>165</b> )	<b>100</b>

saw two mixed pairs and four other adults with what appeared to be intermediate-colored bills. Brown Booby (*S. leucogaster*). This species appears to be more abundant now than prior to the eruption; our highest estimate was 300 pairs in December 2000 (Table 1). The breeding season is protracted and we usually found nesting in all stages. Based on the plumage of adult males, at least two races of Brown Booby breed on the island: a white-headed form and a dark-headed form (Fig. 2). White-headed races of this pantropical species occur only in the eastern Pacific with the most extreme examples (as in Fig. 2, left) occurring only on Clipperton Island (10° 18' N, 109° 13' W) and sometimes referred to as *S. l. nesiotus* (Nelson 1978). The dark-headed form at San Benedicto (Fig. 2, right) doubtless immigrated from the central Pacific because it is not known to breed anywhere else in the eastern Pacific (B. Tershy pers. comm., RLP pers. obs.). Its bill color and plumage is very similar to *S. l. plotus* that occurs, for example, on Johnston Atoll (16° 45' N, 169° 31' W; RLP and LTB pers. obs.) and throughout the central and western Pacific. Intermediate forms also nest on San Benedicto. These could be immigrants from populations elsewhere in the eastern Pacific (*S. l. brewsteri* from the Gulf of California, or *S. l. etesiaca* farther south) or hybrids of the two extreme forms.

Red-footed Booby (*S. sula*). Prior to the 1952 eruption, this was by far the most abundant booby on the island (Anthony 1898, Kaeding 1905, Hanna 1926), but since the eruption the Masked Booby has taken its place; recent estimates all have been about 60 nesting pairs (Table 1). This species has a protracted breeding season at San Benedicto; nests containing fresh eggs, chicks, and ready-to-fledge young have been observed in November, December, February, and April (Howell and Webb 1990, this study).

Great Frigatebird (*Fregata minor*) and Magnificent Frigatebird (*F. magnificens*). All visitors to the island recorded frigatebirds but it was not until 1978 that the presence of two species was recognized (Jehl and Parkes 1982). In Table 1, for convenience, we included all unidentified frigatebird counts prior to 1978 under *F. minor*. Contrary to Jehl and Parkes (1982), frigatebirds do regularly appear at islands far from nesting colonies (see Bowler et al. 2002). For example, at Clipperton Island, we have at times counted over 1,000 frigatebirds, mostly *F. minor* but with some *F. magnificens* usually present. Even though adults are always present, and *F. minor* males sometimes display inflated gular sacs, frigatebirds have never been known to nest at Clipperton (Stager 1964; RLP pers. obs.). Similarly, at San Benedicto, in addition



FIG. 2. Two different forms of adult male Brown Boobies nesting at San Benedicto Island, Mexico, on 3 December 1999. (Left) A white-headed form resembling *Sula leucogaster nesiotus* from Clipperton Island; this bird was with a chick. (Right) A dark-headed form (identified as a male by voice and blue facial skin color) similar to *S. l. plotus* from the central Pacific; this bird was on eggs. Photographs by R. L. Pitman.

to a breeding population of about 165 pairs of *F. minor*, there is an annually and seasonally fluctuating population of nonbreeders that appears only to roost there. In December 2000, the latter group was about 200 birds. The only confirmed nesting records of *F. magnificens* were two pairs in February 1988 (Howell and Webb 1990) and 5–10 pairs in April 1992 (S. N. G. Howell unpubl. data). We never observed nesting, but several males were displaying in a *F. minor* colony in December 2000. At that time an estimated 100 other individuals were present at the island, probably roosting only as described above.

**Brown Noddy (*Anous stolidus*).** Within the archipelago, this species is known to breed only at Roca Partida and on O'Neal Rock at Socorro; there are no previous records from San Benedicto. We saw a pair flying around the north end in November 1990, and a single bird in December 2000. A few pairs could breed on the cliff faces or offshore stacks but confirmation is lacking.

*General discussion.*—With four species of

boobies, two frigatebirds, and two tropicbirds, the diversity of breeding pelicaniforms at San Benedicto Island is, to our knowledge, unrivaled anywhere in the world. Although the island continues to be uninhabited by humans and free of introduced predators, it has not been totally free of human disturbance. For example, in March 1988 we found that much of the northern part of the island had been burned, there are old fragments of exploded ordnance on the island (presumably from military target practice), and sportfishing boats that regularly ply the nearshore waters inadvertently catch and drown unknown numbers of young boobies and frigatebirds with their trolling gear (RLP pers. obs.). However, the overall effects of these activities appear to have been relatively minor, which provides us with an opportunity to consider some of the natural avifaunal changes that have occurred there over the past century.

Currently, there still are only marine birds breeding on the island. Brattstrom (1963) suggested that 99% of the seabirds on San Be-



nedicto were killed outright by the 1952 eruption, but the prevalence of asynchronous breeding that we observed makes it unlikely that a single event could kill off such a large percentage of the population. There have, however, been changes in the species composition and relative abundance of the breeding birds, and these changes fall into two categories: responses to the 1952 eruption, and colonizations by central Pacific species.

The most significant population change has been the Masked Booby replacing the Red-footed Booby as the most abundant sulid on the island (Jehl and Parkes 1982). As an example, when egg collector E. Harrison (unpubl. data) visited in April 1940, he collected egg sets from 103 Red-footed Boobies, 39 Masked Boobies, and 11 Brown Boobies. Changes in the island flora related to the 1952 eruption may explain this shift. Red-footed Boobies usually nest in trees or shrubs while Masked Boobies are ground nesters (Brattstrom 1963, Nelson 1978). Prior to the eruption, the most conspicuous plant on the island was a grass (*Cenchrus myosuroides*). It grew to 2 m high in dense stands and was "very common in the flats" (Johnston 1931). It became extinct on the island after the eruption (Levin and Moran 1989) and Masked Boobies now nest in the flats.

In addition to pelicaniforms, one or two species of shearwater currently breed on the island. As expected for burrow nesters, the populations of both declined initially after the eruption, but they failed to recover, which raises some conservation issues. San Benedicto is the only island in the eastern Pacific where Wedge-tailed Shearwaters breed and that population appears to be morphologically distinct. Wedge-tailed Shearwaters are polymorphic and compared to central Pacific populations, light morphs from San Benedicto are smudgy and not as cleanly marked, dark morphs are lighter brown, and intermediate birds occur more commonly. An investigation into the taxonomic status of this small, isolated population should be an important conservation priority. As for Townsend's Shearwater, even a small colony at San Benedicto could be important for this species' survival, given that the only other breeding populations of this Revillagigedos endemic, at Socorro and

Clarión islands, currently are threatened by introduced predators (Collar et al. 1994).

Another, perhaps positive, effect of the eruption was the elimination of ravens from the island, which were common prior to the eruption (Anthony 1898, Kaeding 1905). Brattstrom and Howell (1956) suggested that the ravens on San Benedicto were not resident but instead visitors from Clarión. However, no ravens have been observed at San Benedicto since the eruption, so it is likely they were residents (Jehl and Parkes 1982). Anthony (1898) commented that it was odd that ravens were common on both Clarión and San Benedicto, but absent from the much larger Socorro Island. This may be due to the fact that the main seabird colonies in the Revillagigedos are on Clarión and San Benedicto, which could provide opportunities for ravens to feed on chicks, eggs, and regurgitated food. The extent to which ravens could have affected nesting seabirds at San Benedicto is unknown, but may have been substantial. McLellan (1926), for example, reported that ravens at Clarión "were seen hovering over shearwater burrows, and it was thought that they feed to some extent on young shearwaters and boobies." Similarly, Santaella and Sada (1991) suggested that ravens associated with Red-footed Booby colonies on Clarión were waiting for opportunities to steal eggs or chicks.

Perhaps a more dramatic change in the San Benedicto avifauna, has been the recent colonization by at least two, and possibly as many as four, species of central Pacific seabirds. The Laysan and Black-footed albatrosses that colonized the island within the past 15 years almost certainly came from colonies in the Hawaiian Islands where the vast majority of both species breeds (Gales 1998). Laysan Albatrosses apparently were prospecting for nest sites in the eastern Pacific as early as the mid-1970s (Pitman 1985), but did not nest on San Benedicto until the late 1980s. The Black-footed Albatross first bred on the island in 2000. A third central Pacific species, Red-tailed Tropicbird, also appears to have colonized San Benedicto recently, possibly in the 1980s, and at least some of the Brown Boobies that nest on the island undoubtedly came from central Pacific colonies, although the date of colonization is unknown.

The cause(s) for these breeding range ex-

tensions is not known, but the fact that there are several species involved suggests a change in the marine environment. Further investigations at sea and at other breeding islands in the Pacific will be necessary to determine if this avifaunal shift is part of a long term, basin-wide trend, or a short term or localized anomaly. Currently, climate change and its potential effect on ocean ecosystems, including the composition of seabird communities, is a much-debated topic (e.g., Aebischer et al. 1990, Veit et al. 1996, Anderson and Piatt 1999, Oedekoven et al. 2001). One of the best and most cost effective ways of integrating long term changes in oceanographic productivity over a variety of trophic levels will be to continue to monitor seabird colonies with long histories of faunal inventories, colonies such as those on San Benedicto Island.

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#### APPENDIX

Records of migrant birds at San Benedicto Island. \* = new record for San Benedicto, \*\* = new record for Revillagigedo Islands (see Howell and Webb 1992b, Wehtje et al. 1993, and references cited therein)

- \*Great Blue Heron (*Ardea herodias*): 1 in March 1988.
- \*Cattle Egret (*Bubulcus ibis*): 6 in December 2000.
- Osprey (*Pandion haliaetus*): 1 in March 1988.
- Peregrine Falcon (*Falco peregrinus*): 1 in March 1988, 1 in December 1999, 1 adult in December 2000.
- American Kestrel (*Falco sparverius*): 2–3 in March 1988, 2 in November 1990, 3–4 in December 1999.

Golden Plover (*Pluvialis* sp.): 1 in March 1988.

Whimbrel (*Numenius phaeopus*): 1 in March 1988, 1 in November 1990.

Wandering Tattler (*Heteroscelus incanus*): 1 each in May 1987, March 1988, and November 1990.

\*Least Sandpiper (*Calidris minutilla*): 2 in November 1990.

\*\*Common Snipe (*Gallinago gallinago*): 1 in December 2000.

\*Laughing Gull (*Larus atricilla*): 2 juveniles in December 1999.

California Gull (*Larus californicus*): a first-year bird, long dead on beach in March 1988.

\*Short-eared Owl (*Asio flammeus*): 1 in December 2000.

\*\*White-throated Swift (*Aeronautes saxatalis*): 1 in December 1999.

\*Northern Rough-winged Swallow (*Stelgidopteryx serripennis*): 4 in December 2000.

\*\*Violet-green Swallow (*Tachycineta thalassina*): 2 in December 2000.

\*\*Tree Swallow (*Tachycineta bicolor*): 1 in November 1990; 6 in December 2000.

Barn Swallow (*Hirundo rustica*): 1 in November 1990, 2 in December 1999, 1 in December 2000.

\*Northern Mockingbird (*Mimus polyglottos*): 1 in December 1999.

\*Yellow-rumped Warbler (*Dendroica coronata*): 23 in one flock in March 1988.